ABSTRACT OF THE DISCLOSURE

A method and apparatus for reducing the sensitivity of semiconductor processing to chamber conditions is provided. Process repeatability of common processes are affected by changing surface conditions which alter the recombination rates of processing chemicals to the chamber surfaces. In one aspect of the invention, a composition of one or more etchants is selected to optimize the etch performance and reduce deposition on chamber surfaces. The one or more etchants are selected to minimize buildup on the chamber surfaces, thereby controlling the chamber surface condition to minimize changes in etch rates due to differing recombination rates of free radicals with different surface conditions and achieve etch repeatability. In another embodiment, the etchant chemistry is adjusted to reduce the change to internal surface conditions after a cleaning cycle. In another embodiment, a process recipe is selected to reduce the sensitivity of the etch process to the chamber conditions. In another embodiment, chamber surface materials are selected to minimize the differences in recombination rates of free radicals on the surface materials and the byproduct depositions formed on the materials during processing.

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